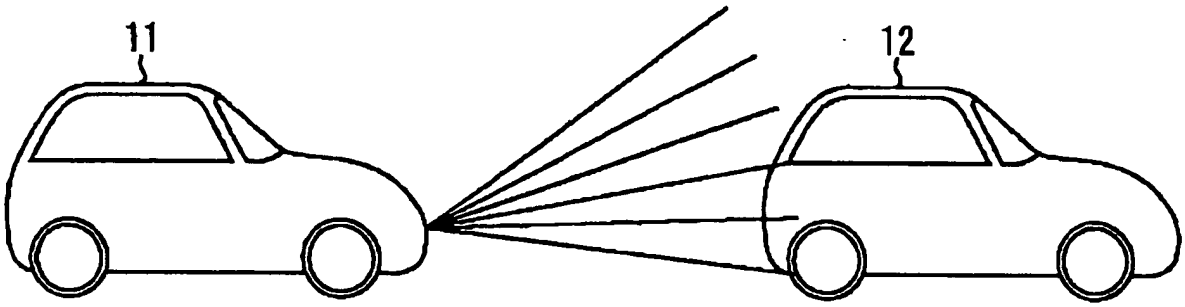

Fig. 1

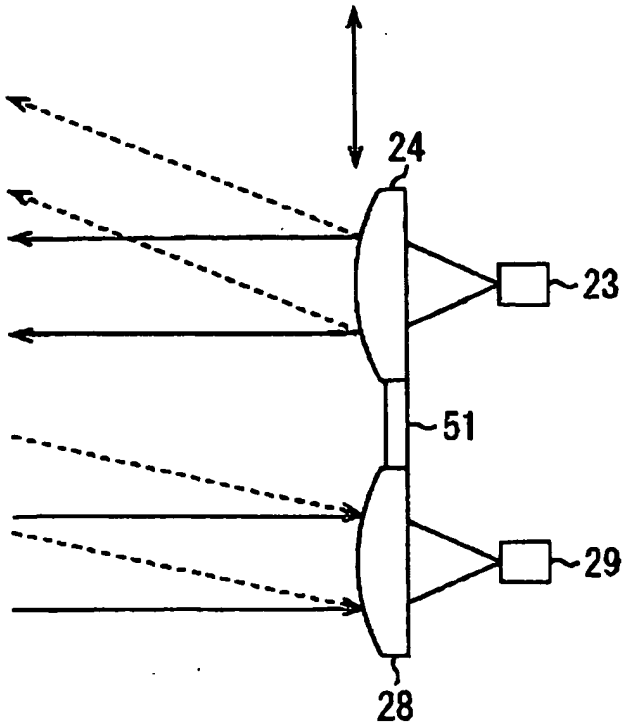

Fig. 4

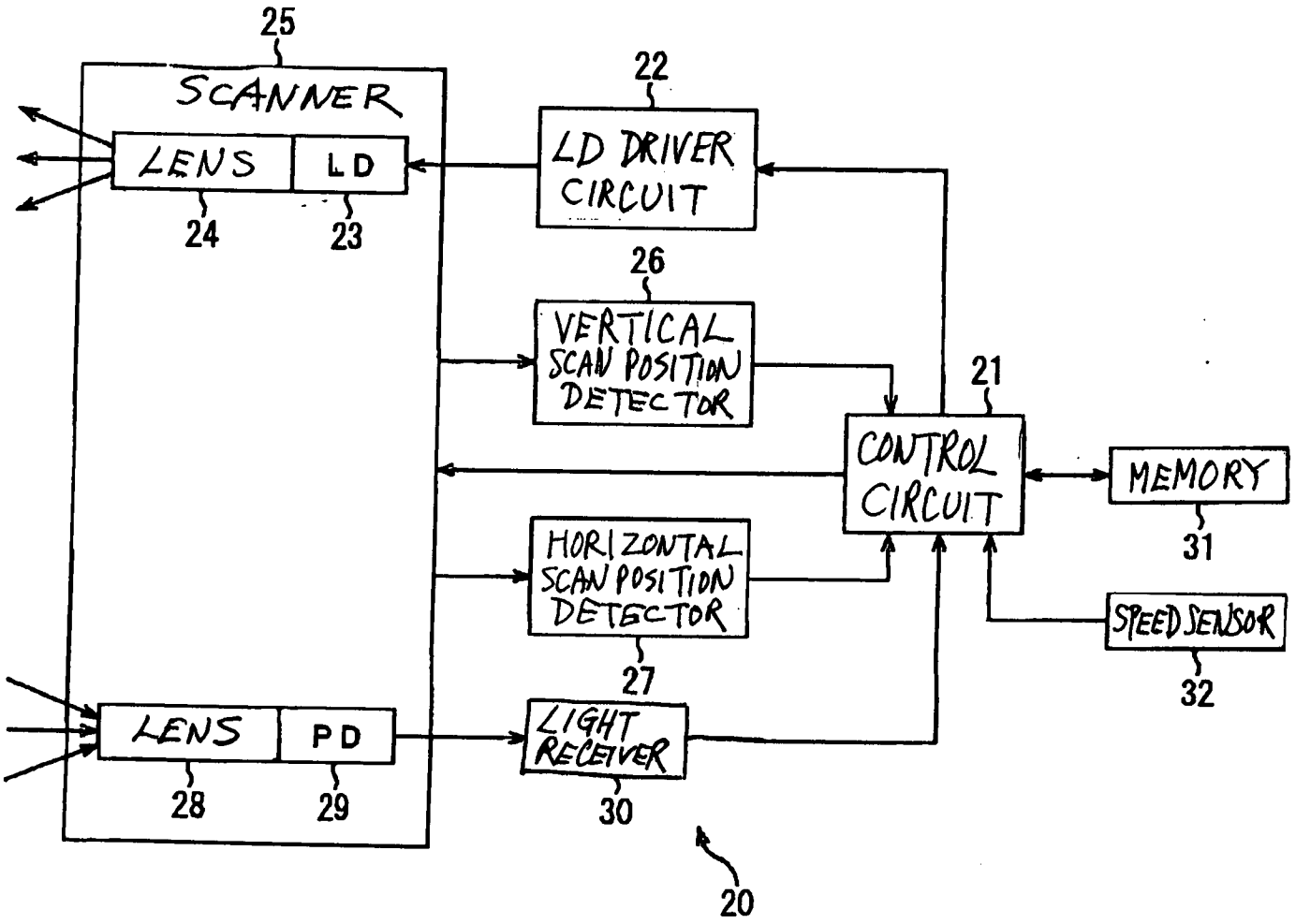
25
SCANNER
LENS
LD
24
23
22
LD DRIVER CIRCUIT
26
VERTICAL SCAN POSITION DETECTOR
21
CONTROL CIRCUIT
MEMORY
31
HORIZONTAL SCAN POSITION DETECTOR
SPEED SENSOR
32
27
LENS
PD
28
29
LIGHT RECEIVER
30
20

Fig. 2

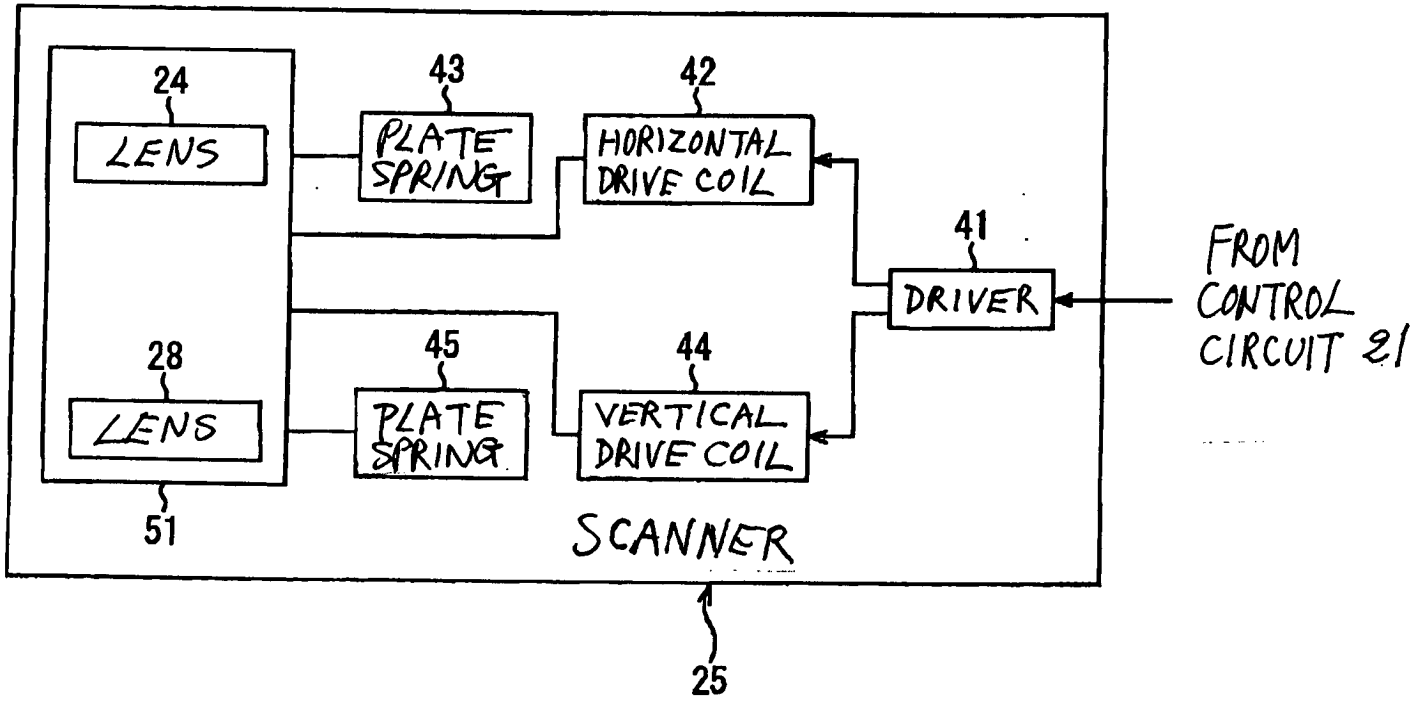
24
LENS
43
PLATE SPRING
42
HORIZONTAL DRIVE COIL
41
DRIVER
FROM CONTROL CIRCUIT 21
28
LENS
45
PLATE SPRING
44
VERTICAL DRIVE COIL
51
SCANNER
25

Fig. 3

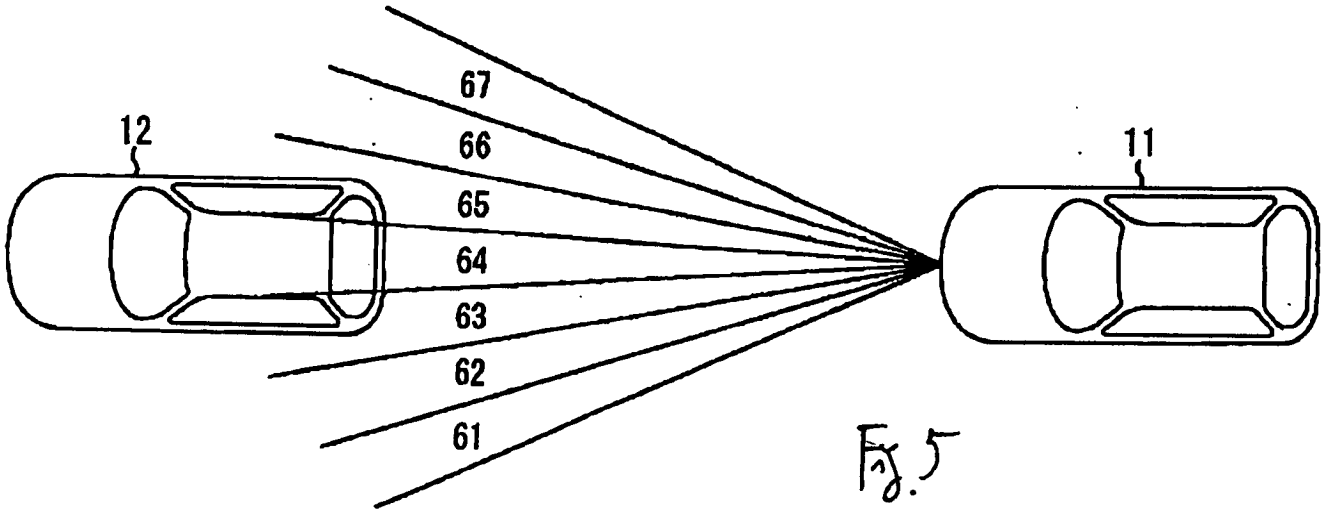

Fig. 5

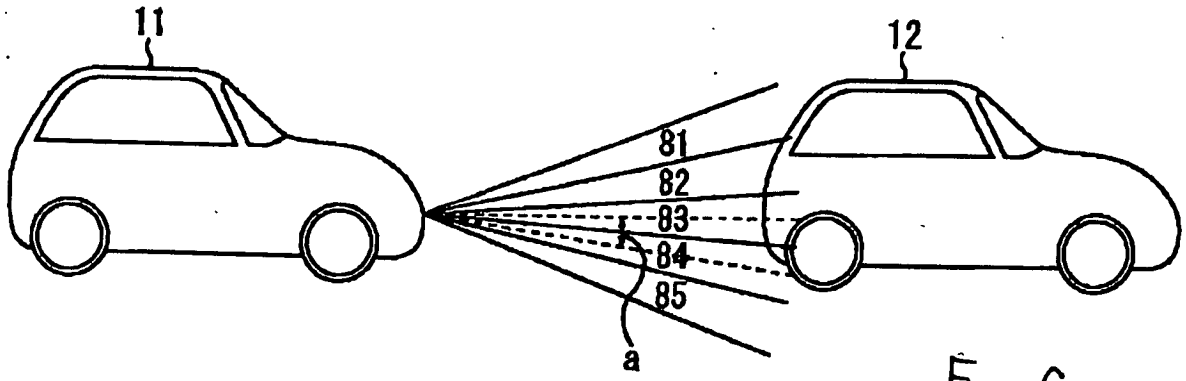

Fig. 6

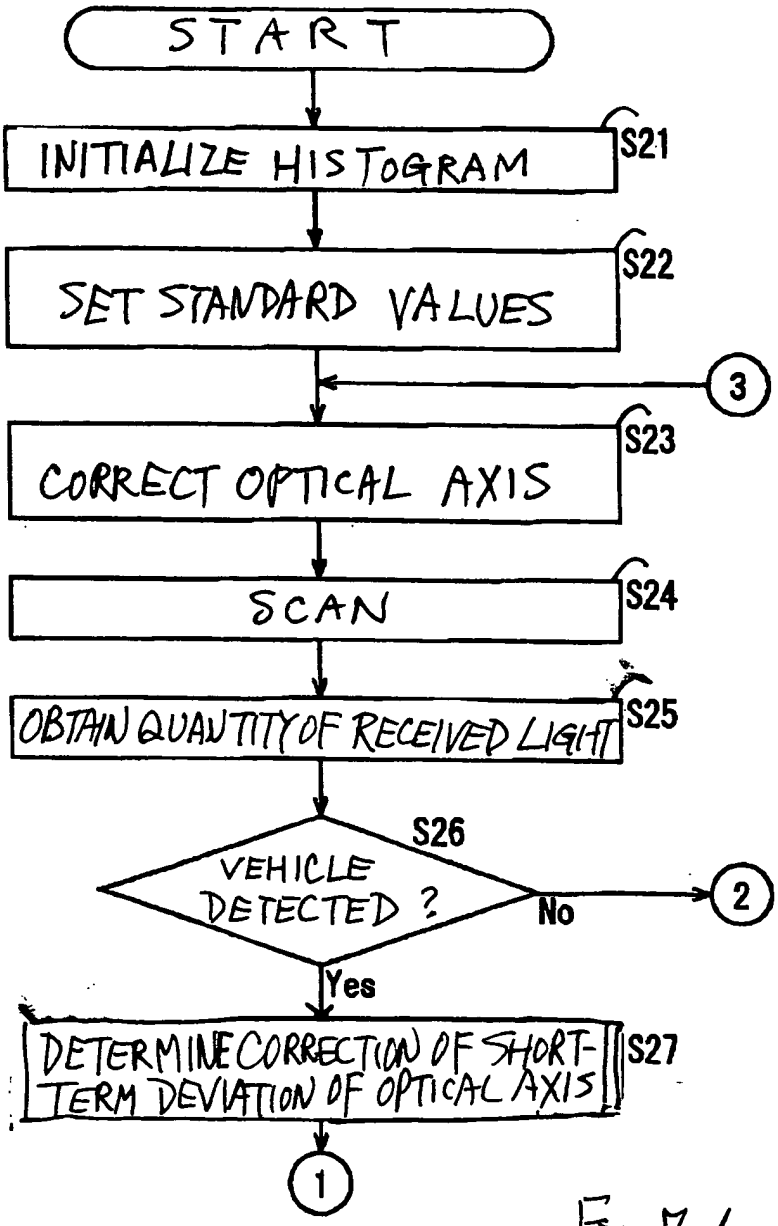
START
INITIALIZE HISTOGRAM
S21
SET STANDARD VALUES
S22
3
CORRECT OPTICAL AXIS
S23
SCAN
S24
OBTAIN QUANTITY OF RECEIVED LIGHT
S25
S26
VEHICLE DETECTED ?
No
2
Yes
DETERMINE CORRECTION OF SHORT-TERM DEVIATION OF OPTICAL AXIS
S27
1

Fig. 7-1

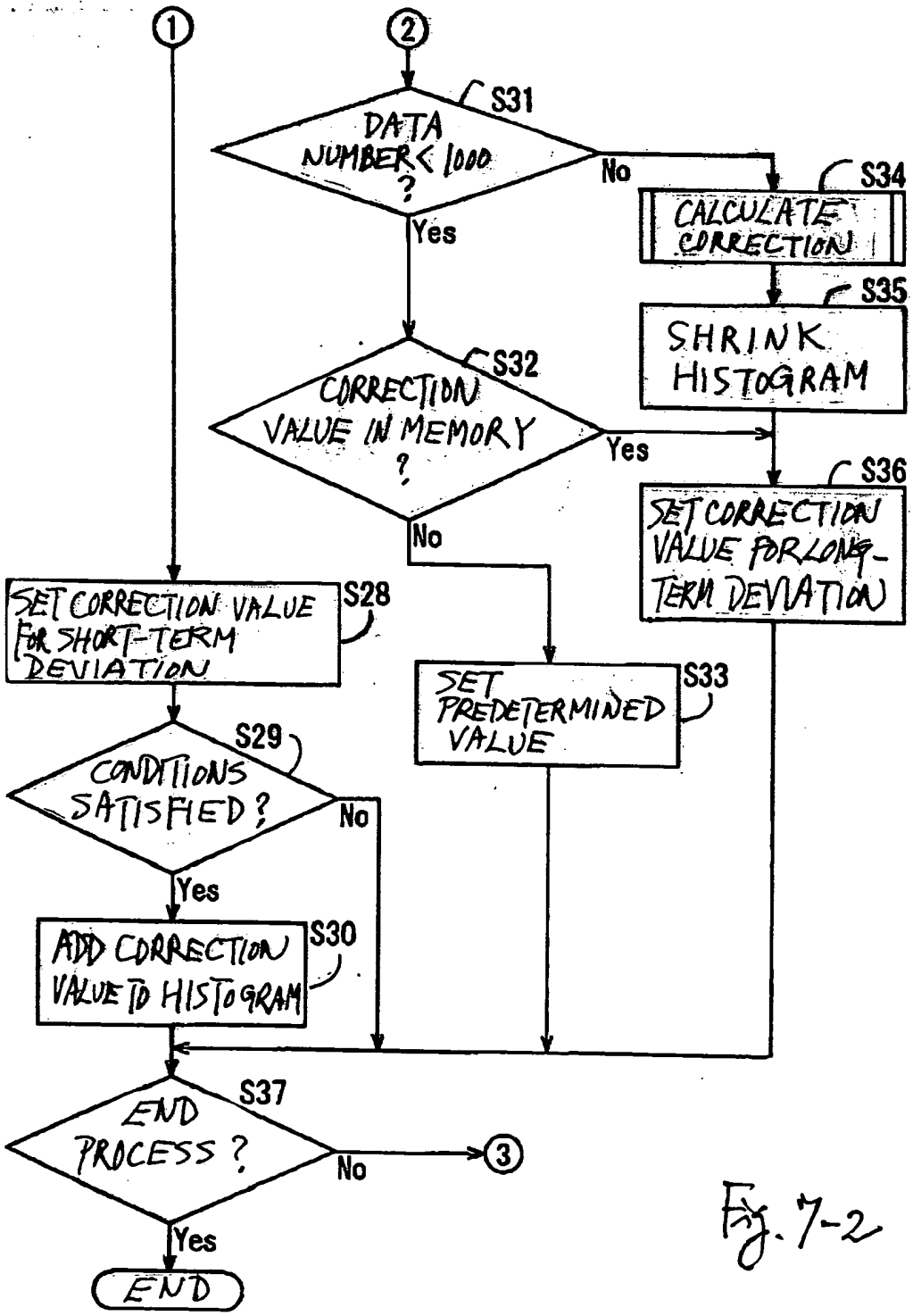
1
2
S31
DATA NUMBER < 1000 ?
No
Yes
S34
CALCULATE CORRECTION
S35
SHRINK HISTOGRAM
S32
CORRECTION VALUE IN MEMORY ?
Yes
No
S36
SET CORRECTION VALUE FOR LONG-TERM DEVIATION
SET CORRECTION VALUE FOR SHORT-TERM DEVIATION
S28
SET PREDETERMINED VALUE
S33
S29
CONDITIONS SATISFIED ?
No
Yes
ADD CORRECTION VALUE TO HISTOGRAM
S30
S37
END PROCESS ?
No
3
Yes
END

Fig. 7-2

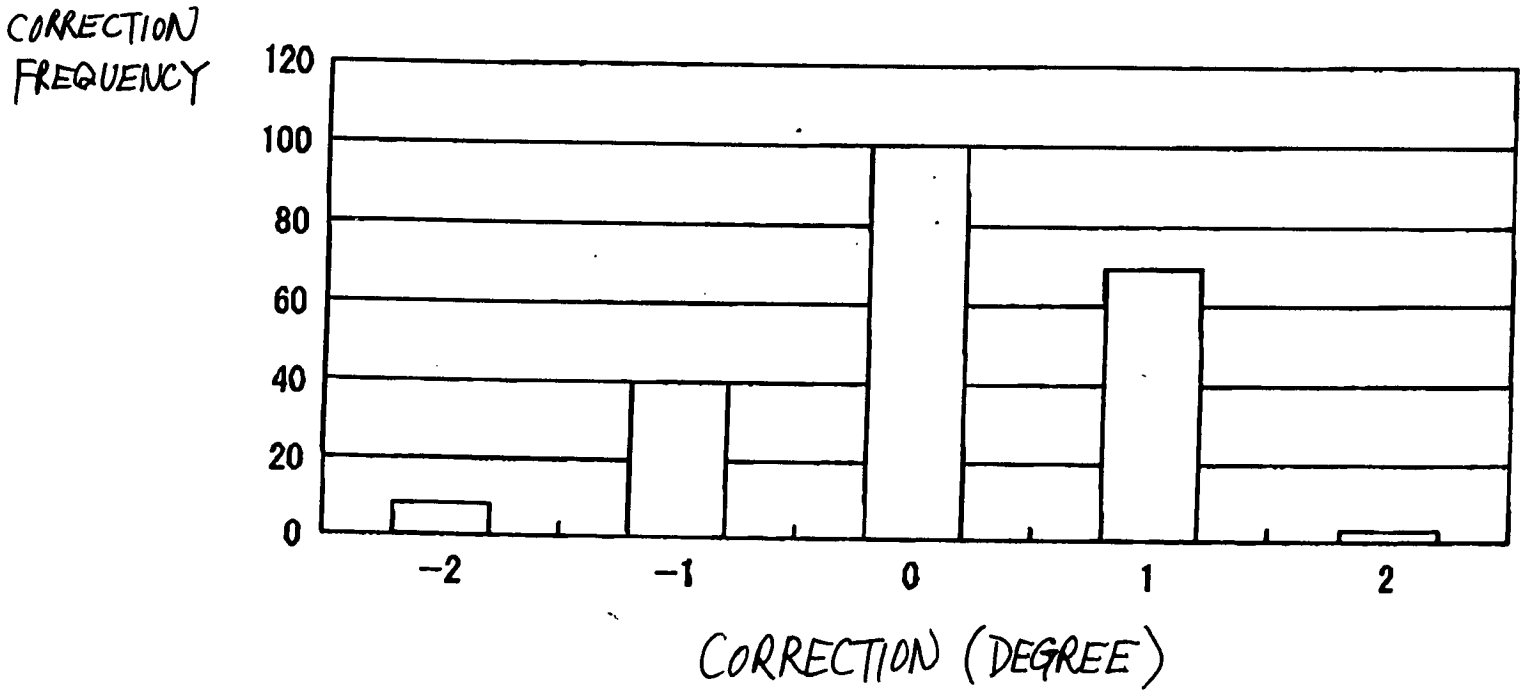
CORRECTION FREQUENCY
120
100
80
60
40
20
0
−2
−1
0
1
2
CORRECTION (DEGREE)

Fig. 8

Upper remainder (2°)
Subscan 1 (2° above main scan)
Subscan 2 (1° above main scan)
Main scan 1 (center of vertical range)
Subscan 3 (1° below main scan)
Subscan 4 (2° below main scan)
Lower remainder (2°)

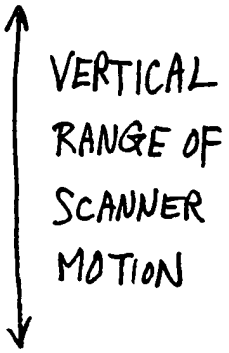

Fig. 9

Upper remainder (1°)
Subscan 1 (3° above subscan 3)
Subscan 2 (2° above subscan 3)
Main scan 1 (1° above subscan 3)
Subscan 3 (center of vertical range)
Subscan 4 (1° below subscan 3)
Lower remainder (3°)

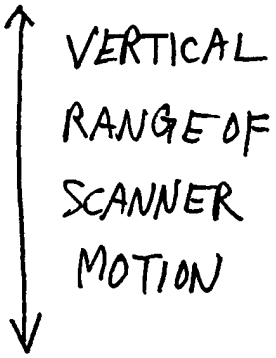

Fig. 10

Upper remainder (4°)
Subscan 1 (center of vertical range)
Subscan 2 (1° below subscan 1)
Main scan 1 (2° below subscan 1)
Subscan 3 (3° below subscan 1)
Subscan 4 (4° below subscan 1)

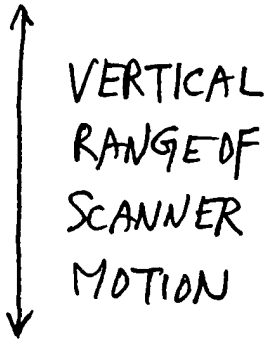

Fig. 11

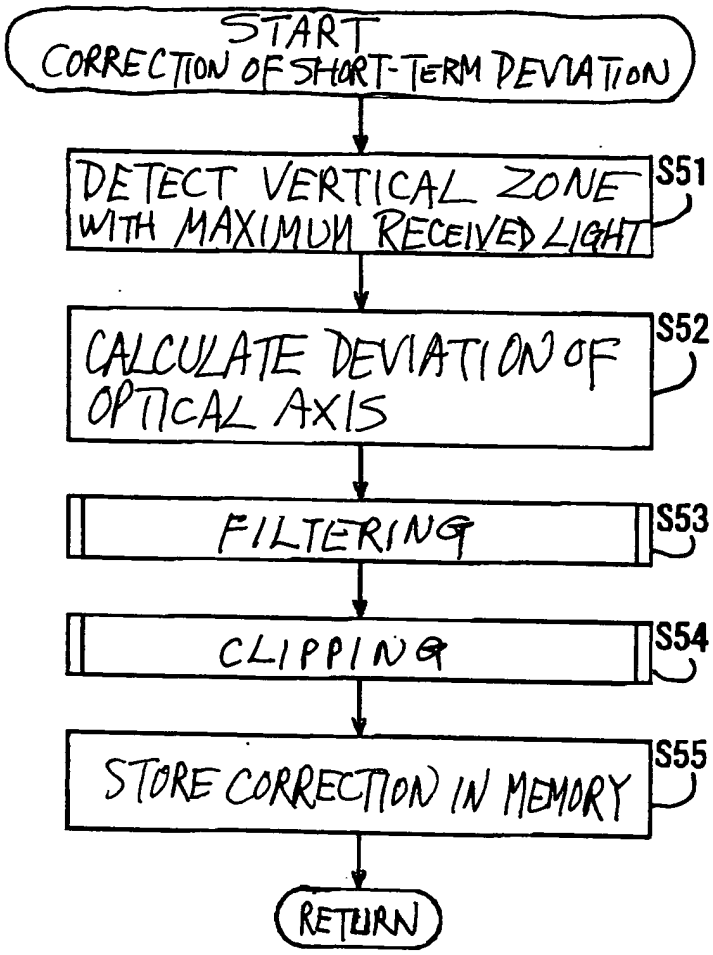
START
CORRECTION OF SHORT-TERM DEVIATION
DETECT VERTICAL ZONE WITH MAXIMUM RECEIVED LIGHT
S51
CALCULATE DEVIATION OF OPTICAL AXIS
S52
FILTERING
S53
CLIPPING
S54
STORE CORRECTION IN MEMORY
S55
RETURN

Fig 12

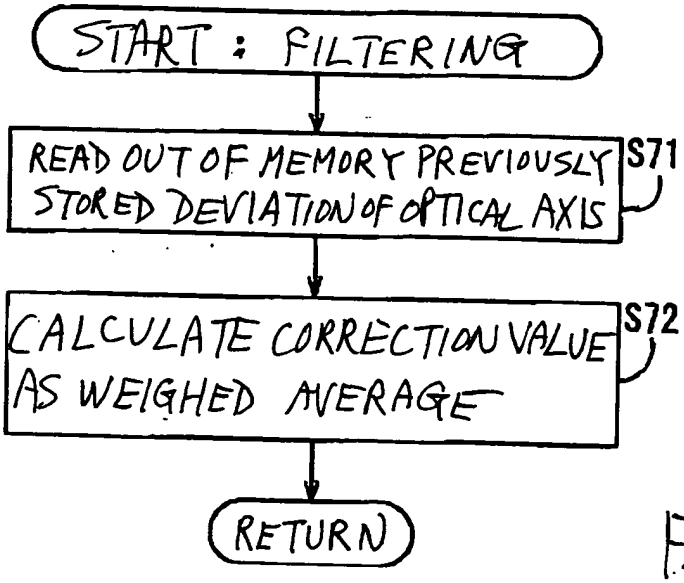
START : FILTERING
READ OUT OF MEMORY PREVIOUSLY STORED DEVIATION OF OPTICAL AXIS
S71
CALCULATE CORRECTION VALUE AS WEIGHED AVERAGE
S72
RETURN

Fig. 13

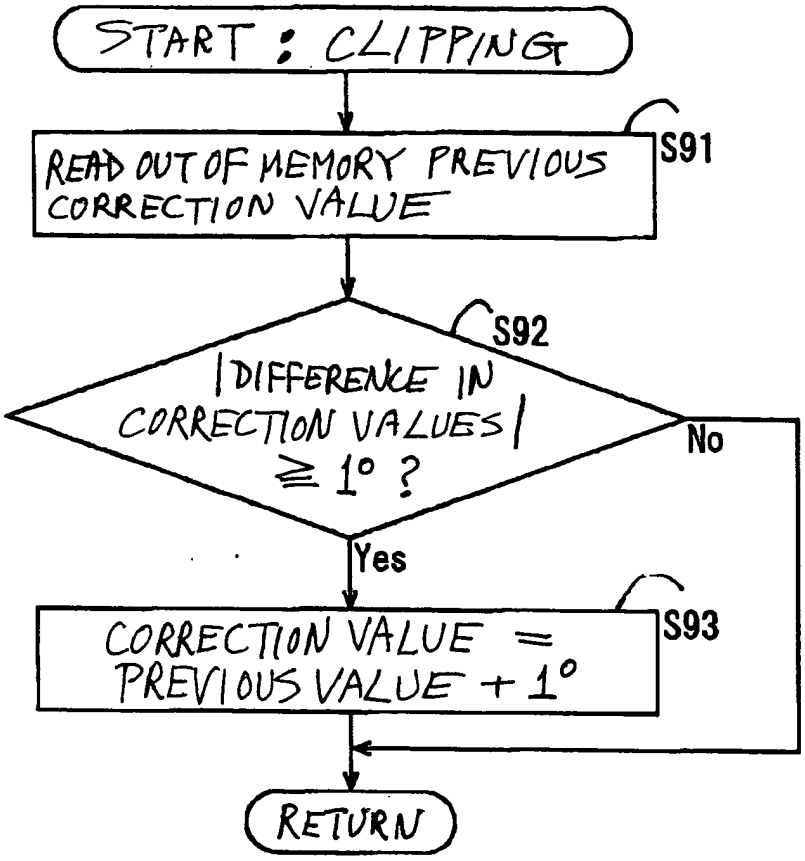
START : CLIPPING
READ OUT OF MEMORY PREVIOUS CORRECTION VALUE
S91
|DIFFERENCE IN CORRECTION VALUES| ≧ 1° ?
S92
No
Yes
CORRECTION VALUE = PREVIOUS VALUE + 1°
S93
RETURN

Fig. 14

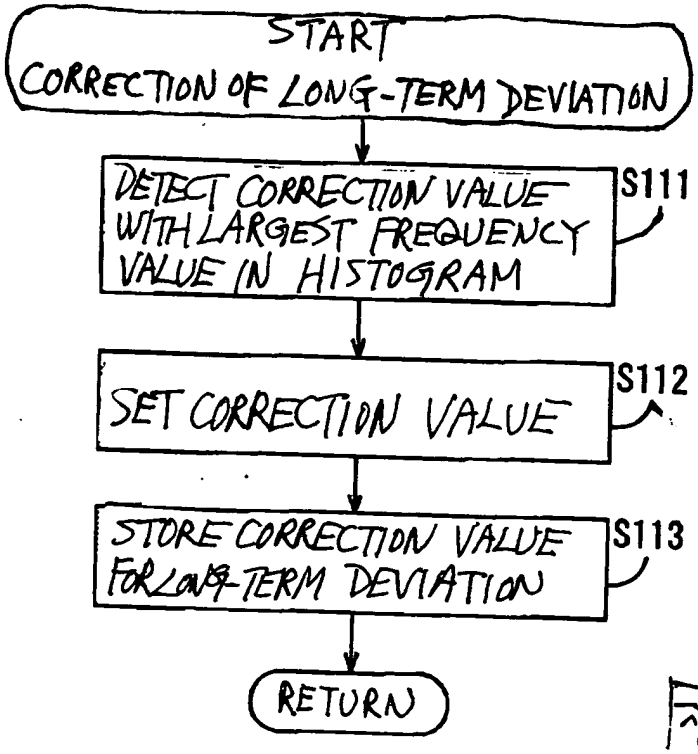
START
CORRECTION OF LONG-TERM DEVIATION
DETECT CORRECTION VALUE WITH LARGEST FREQUENCY VALUE IN HISTOGRAM
S111
SET CORRECTION VALUE
S112
STORE CORRECTION VALUE FOR LONG-TERM DEVIATION
S113
RETURN

Fig. 15